

## C. GOLDEN TILEFISH ASSESSMENT SUMMARY FOR 2005

**State of Stock:** The Golden tilefish stock is not overfished and overfishing is not occurring (Figure C1). Fishing mortality in 2004 was estimated to be 87% of  $F_{msy}$  (Figure C1), and total biomass in 2005 was estimated to be 72% of  $B_{msy}$ . Stock biomass in 2005 is above that projected for 2005 in the 1998 assessment (59% of  $B_{msy}$ ). However high variability exists in the terminal year ratio estimates. The 80% confidence interval for the 2004  $F/F_{msy}$  ratio is between 0.5 and 1.3 and for the 2005  $B/B_{msy}$  ratio is between 0.5 and 1.2 (Figure C2).

**Forecast:** Given the high variance associated with the terminal year estimates of 2004  $F/F_{msy}$  and 2005  $B/B_{msy}$  ratios, projections were not conducted as these were considered too uncertain to form the basis for evaluating likely biomass recovery schedules relative to  $B_{msy}$  under various TAC strategies.

### Landings and Status Table (weights in '000 mt live): Golden tilefish

Year	1998	1999	2000	2001	2002	2003	2004	2005	Max <sup>1</sup>	Min <sup>1</sup>	Mean <sup>1</sup>
Commercial landings	1.3	0.5	0.5	0.9	0.9	1.1	1.2	-	4.0	0.4	1.6
$B/B_{msy}$ ratios	0.3	0.3	0.4	0.5	0.5	0.6	0.7	0.7	1.5	0.3	0.7
$F/F_{msy}$ ratios	2.1	0.8	0.6	0.9	0.8	0.9	0.9	-	4.0	0.2	1.4
Total biomass	3.1	2.9	3.4	4.2	4.8	5.5	6.1	6.7	13.9	2.5	6.2
Total fishing mortality	0.45	0.17	0.13	0.19	0.17	0.19	0.18	-	0.86	0.04	0.29

<sup>1</sup> Over period 1973-2004.

**Stock Distribution and Identification:** Golden tilefish, *Lopholatilus chamaeleonticeps*, inhabit the outer continental shelf from Nova Scotia to South America, and are relatively abundant in the Southern New England to Mid-Atlantic region at depths from 80 to 440 m. Tilefish have a narrow temperature preference of 9 to 14 °C. The Virginia-North Carolina border, defines the stock boundary between the northern and southern stocks.

**Catches:** Total commercial landings (live weight) increased from less than 125 mt during 1967-1972 to more than 3,900 mt in 1979 and 1980 (Figure C3). Landings stabilized at about 2,000 mt during 1982-1986. Landings increased in 1987 to 3,200 mt but subsequently declined to 450 mt in 1989. During 1988 to 1998, annual landings ranged between 454 and 1,838 mt. Landings during 1999 to 2002 were below 900 mt (ranging from 506 to 874 mt). An annual quota of 905 mt was implemented in November 2001. Landings in 2003 and 2004 exceeded the quota at 1,130 and 1,182 mt respectively. Since the 1980s, over 85% of the commercial landings of tilefish have been taken in the longline fishery. Recreational catches have been low for the last 25 years (i.e., less than 1 mt caught annually).

**Data and Assessment:** The MAFMC Science and Statistical committee last reviewed the Golden tilefish assessment in 1998. A surplus production model (ASPIC) was the basis for rebuilding of the tilefish stock in the Tilefish Fishery Management Plan implemented in November 2001. The updated assessment used the ASPIC model with three separate CPUE series (Turner, weighout, and VTR) (Figure C4). The biomass-based models AIM (An Index Method; NFT 2005) and lagged-recruitment survival growth (LRSG) produced results similar to ASPIC.

**Biological Reference Points:** Updated estimates of biological reference points from the ASPIC model ( $B_{msy} = 9,384$  mt,  $F_{msy} = 0.21$ , and  $MSY = 1,988$  mt) did not change greatly from the 1998 assessment ( $B_{msy} = 8,448$  mt,  $F_{msy} = 0.22$ , and  $MSY = 1,888$  mt used in the tilefish fishery management plan).  $F_{max}$  was the same in both assessments, 0.14.

**Fishing Mortality:** During 1978-1987, fishing mortality was above  $F_{msy}$  (Figure C1). Fishing mortality fluctuated below and above  $F_{msy}$  from 1989 to 1998. Since 1999,  $F$  has been below  $F_{msy}$  (Figure C1). The 2004  $F$  to  $F_{msy}$  ratio was 0.87 ( $F_{2004} = 0.18$ ,  $F_{msy} = 0.21$ ). The 80% confidence interval for the 2004  $F/F_{msy}$  ratio is between 0.5 and 1.3 (Figure C2).

**Biomass:** During 1974-1980, stock biomass was above  $B_{msy}$ , but has since been below  $B_{msy}$  (Figure C1). Biomass was below  $\frac{1}{2} B_{msy}$  from 1988 through 2001, but has since increased to 72% of  $B_{msy}$  in 2005 ( $B_{2005} = 6,712$  mt,  $B_{msy} = 9,384$  mt). The 80% confidence interval for the 2005  $B/B_{msy}$  ratio is between 0.5 and 1.2 (Figure C2).

**Recruitment:** Estimates of recruitment do not exist. However strong recruitment events are evident in the size composition of the commercial landings. Most of the catch between 2002 and 2004 appears to have been from the 1999 year class with no signs of recruitment after this cohort (Figure C5).

#### **Special Comments:**

1) The partial recruitment pattern is unknown for the tilefish longline fishery because targeting of year classes to increase catch rates and market conditions will influence the size of fish landed. The price on the large market category in this fishery is particularly sensitive to the quantity of large fish landed. There is concern that fishing mortality may be higher than estimated by the surplus production model due to the relative lack of larger/older fish in the catches.

2) The inability to characterize the partial recruitment pattern, the possibility of unknown refuge effects due to conflicts with lobster and trawl gear and effects of the targeting of incoming year classes by the fishery introduce considerable uncertainty in interpreting CPUE from this fishery as a measure of stock abundance. Concerns exist that recent CPUE values have been increasing faster than stock biomass. CPUE and catch length frequency data in this fishery may be as much a reflection of changes in fishing practices and the spatial distribution of the fish rather than fluctuations in population size.

#### **Sources of Information:**

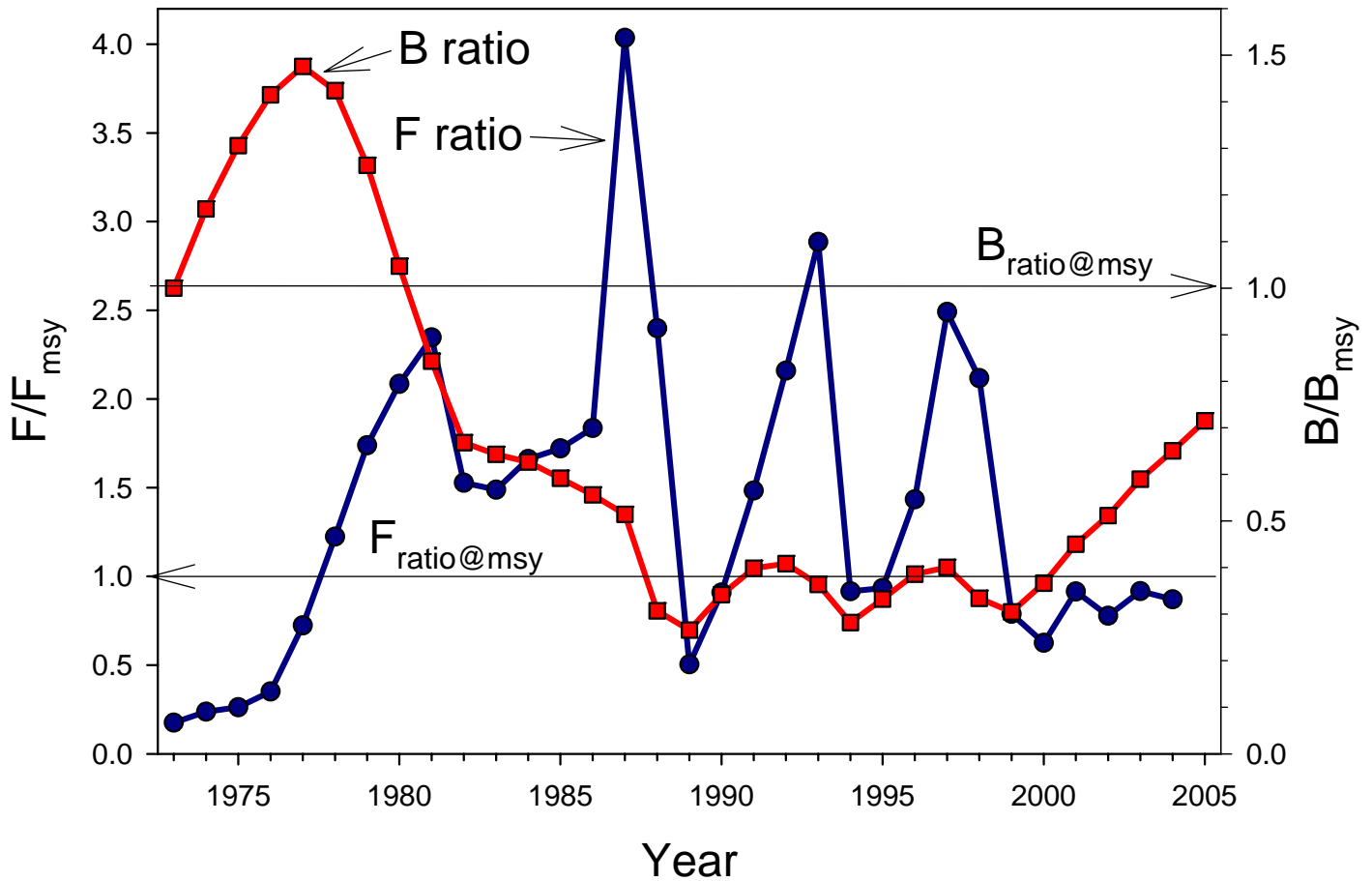
Assessment of Golden Tilefish, *Lopholatilus chamaeleonticeps*, in the Middle Atlantic-Southern New England Region. Report of the Southern Demersal Working Group, SAW 41 Working Paper C1.

Mid-Atlantic Fishery Management Council. 2000. Tilefish fishery management plan.

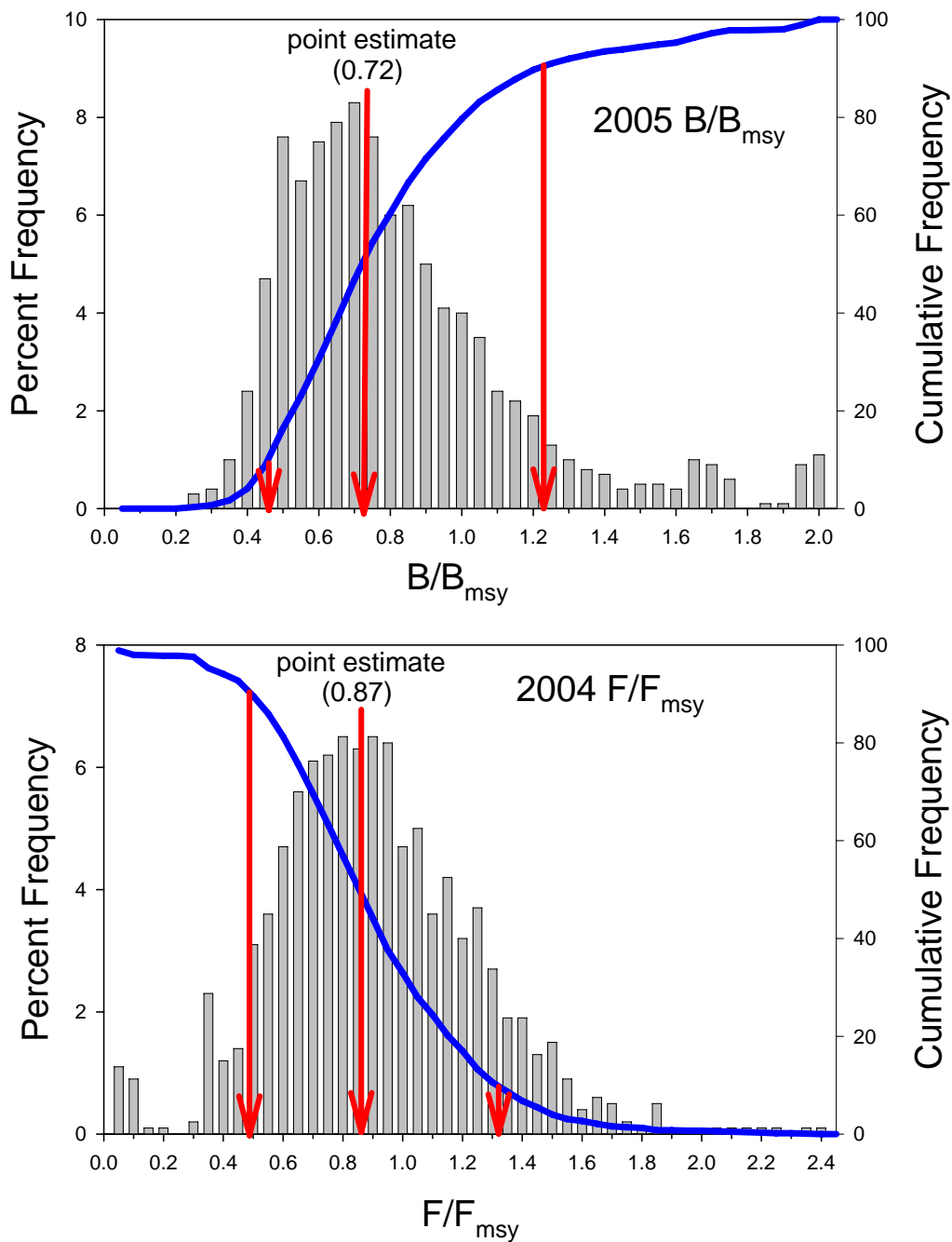
Nitschke, P., G. Shepherd, and M. Terceiro. 1998. Assessment of tilefish in the middle Atlantic – southern New England region. 12 pp. (unpublished report from NEFSC, reviewed by the MAFMC Science and Statistical Committee).

NOAA Fisheries Toolbox Version 2.6. (NFT). 2005. AIM (Internet address: <http://nft.nefsc.noaa.gov>).

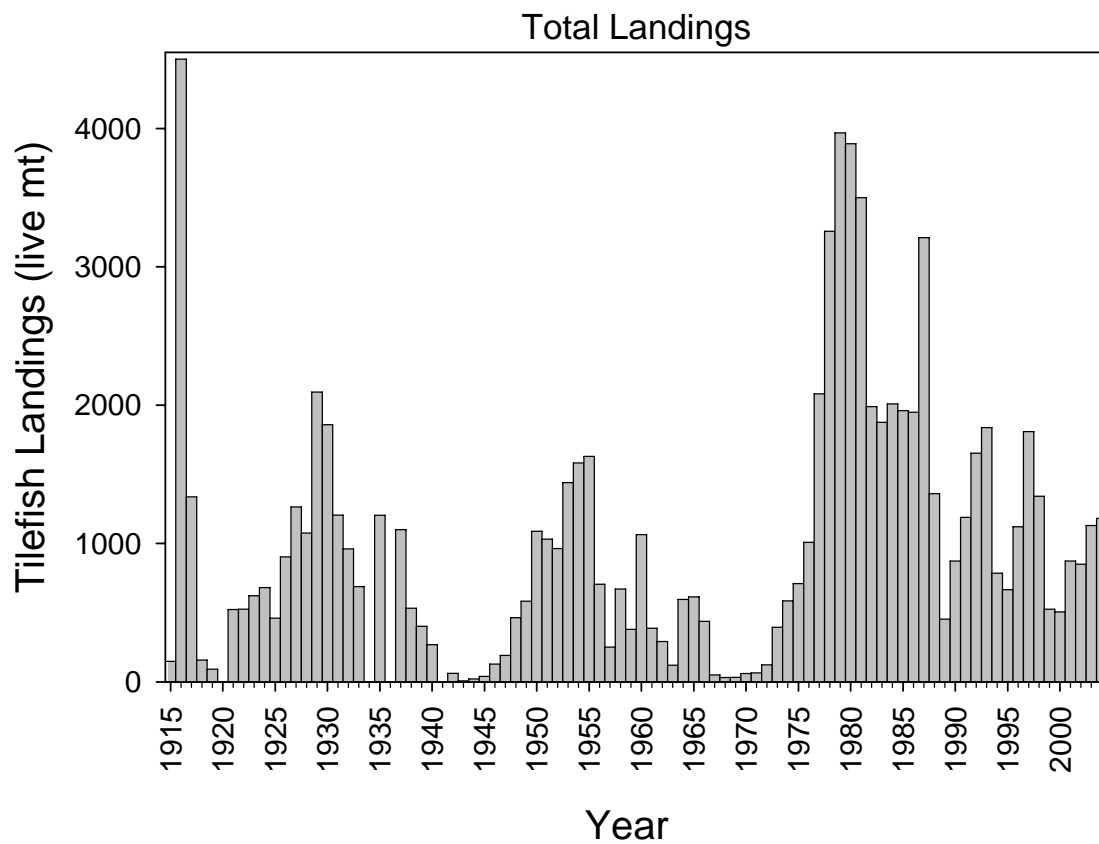
Turner, S.C. 1986. Population dynamics of and, impact of fishing on tilefish, *Lopholatilus chamaeleonticeps*, in the Middle Atlantic-Southern New England region during the 1970's and early 1980's. New Brunswick, N.J. Rutgers University. Ph.D. dissertation.



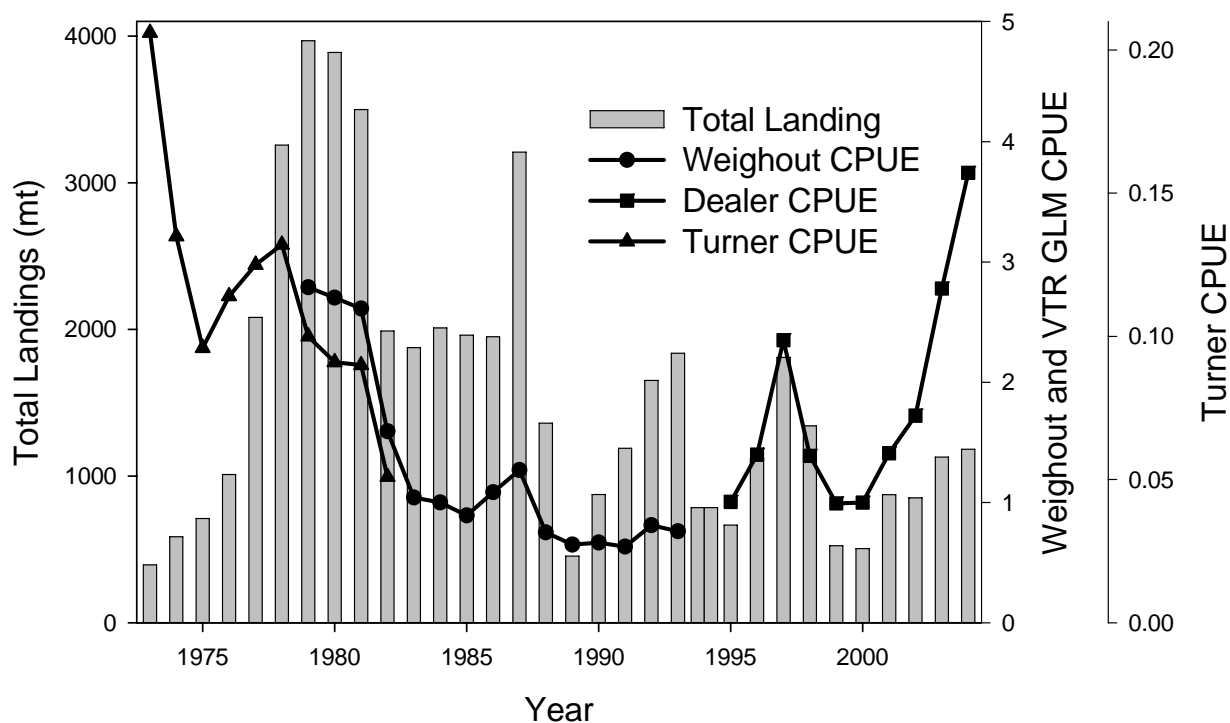
**C1.** Tilefish. Trends in  $F/F_{msy}$  and  $B/B_{msy}$  ratios for the base ASPIC run 13 which fixed the  $B1/B_{msy}$  ratio at 1 and used three CPUE series (Turner, weighout, and VTR).



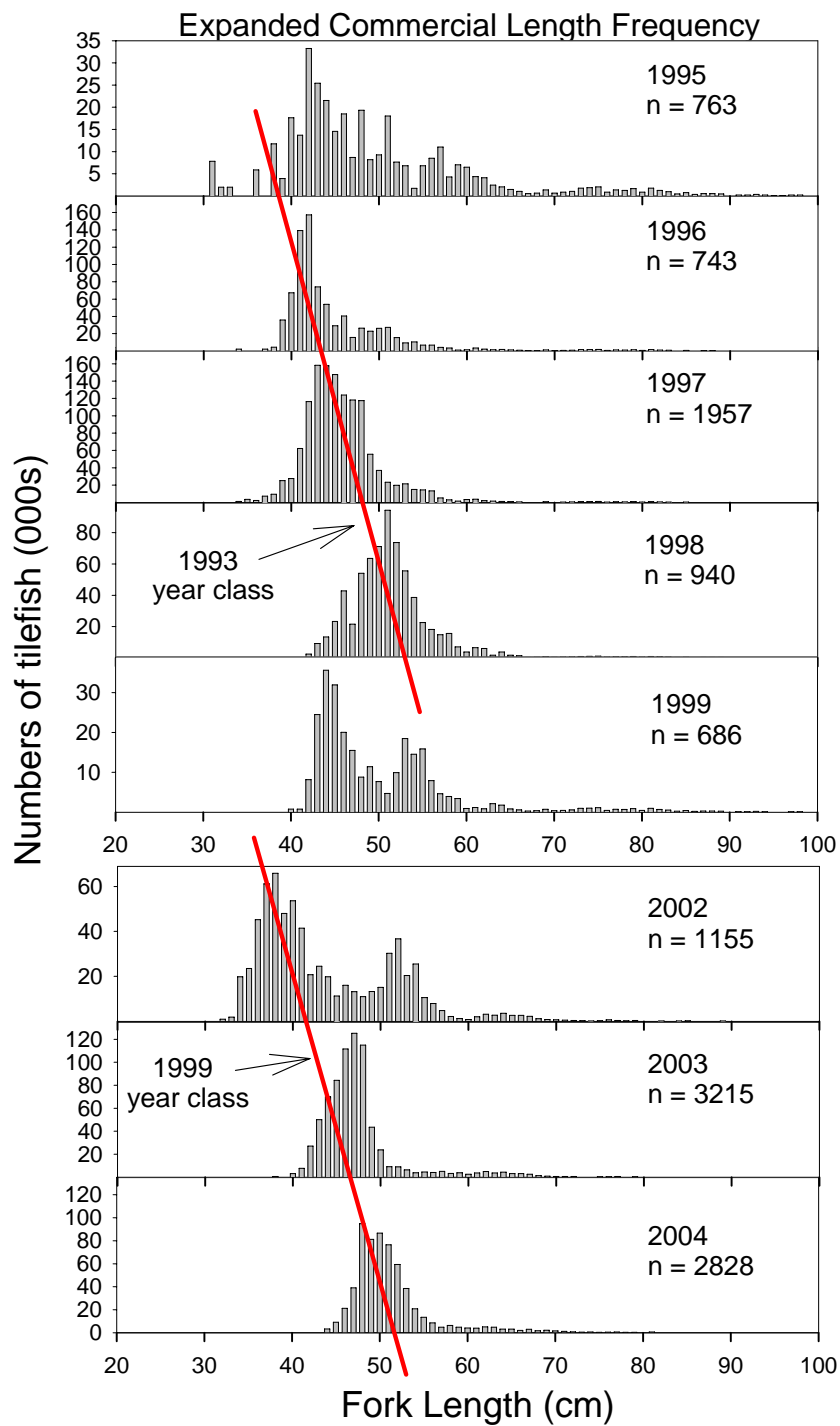
**C2.** Precision of estimates of total stock biomass to  $B_{msy}$  ratios and fishing mortality to  $F_{msy}$  ratios for Golden tilefish. Vertical bars display the range of the bootstrap estimates. The percent confidence limits can be taken off the cumulative frequency curve.



**C3.** Landings of Golden tilefish from 1915-2004.



**C4.** Tilefish. GLM CPUE for the weighout and VTR data split into two series. Four years of overlap between Turner (1986) and the weighout CPUE series can be seen. Total Dealer landings are also shown.



**C5.** Expanded tilefish catch length frequency distributions by year.